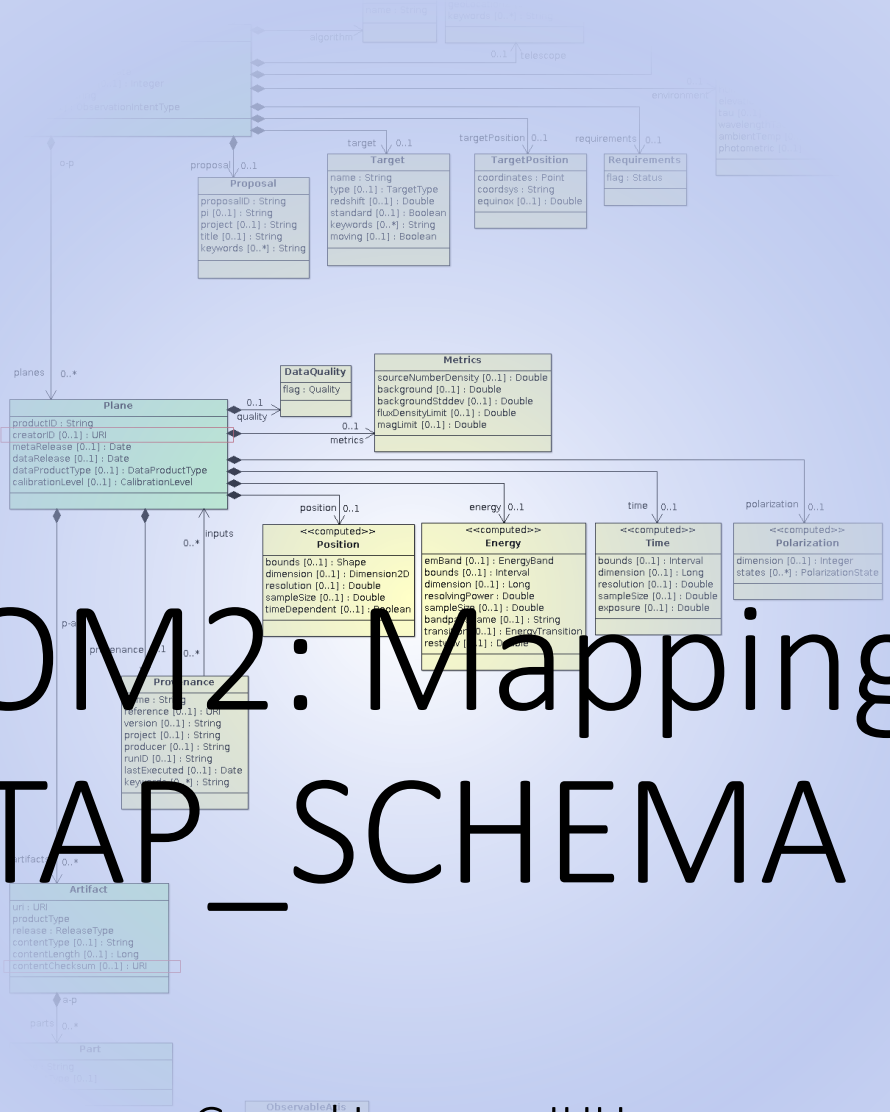

CAOM2: Mapping a TAP_SCHEMA

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IVOA Interop Chile, 2017-10-28

Goal 1:

Annotate CADC CAOM2 TAP service @

http://www.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/tap/tables

with CAOM2 data model @

https://github.com/opencadc/caom2/raw/master/caom2-dm/src/main/resources/CAOM-2.3.png

•

Step 1: generate guess at annotation

- Python notebook retrieves …/tables endpoint from CADC and STScI CAOM2 tap_schemas
- Transforms all <tables> to empty <TABLE> declarations in a VOTable.
- Adds guess at annotation.
  - TEMPLATES per table
  - Single INSTANCE with dmtype given by TABLE@utype if available
  - ATTRIBUTE per FIELD with dmrole given by FIELD@utype if available
  - predict ivoa-types for xtype/datatype-s

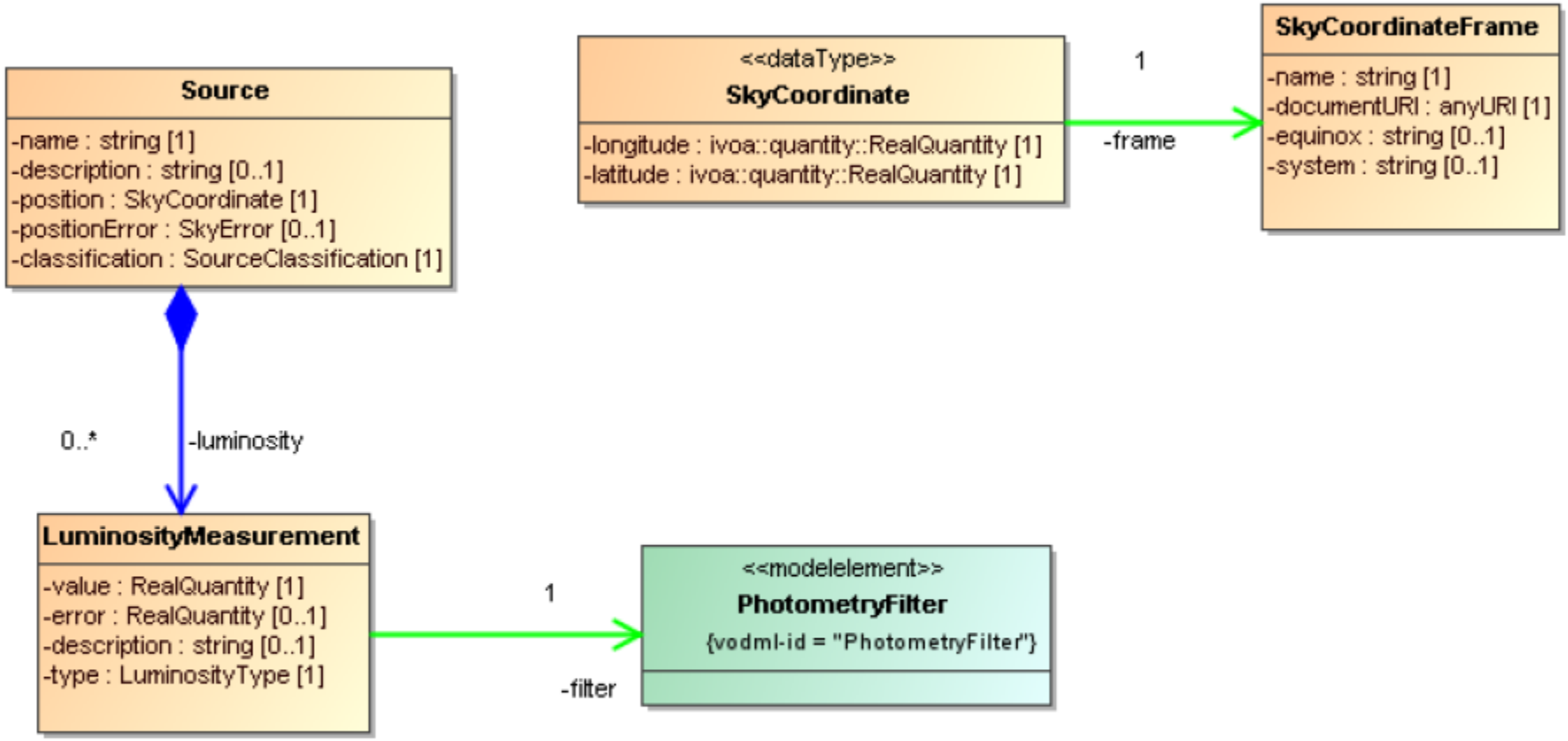
Step 2: Hand-fix annotation

- Check dmtype/dmrole wrt VO-DML/XML
- Group ATTRIBUTEs in INSTANCE if they belong to structured ATTRIBUTE (DataType)
  - Update dmroles
- Group ATTRIBUTEs in INSTANCE if they belong to COMPOSITION
  - Update dmroles
- Interpret ***Id columns as PRIMARYKEY, CONTAINER or REFERENCE
- Some more

results

- Generated
- Hand fixed

Goal 2: illustrate potential issues



```
<?xml version="1.0" ?>
<VOTABLE xmlns="http://www.ivoa.net/xml/VOTable/v1.4_vodml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.ivoa.net/xml/VOTable/v1.4_vodml http://volute.g-vo.org
  <VODML>
    <MODEL>
      <NAME>ivoa</NAME>
      <URL>http://volute.g-vo.org/svn/trunk/projects/dm/vo-dml/models/ivoa/vo-dml/IVOA-
    </MODEL>
    <MODEL>
      <NAME>filter</NAME>
      <URL>http://volute.g-vo.org/svn/trunk/projects/dm/vo-dml/models/sample/filter/vo-
    </MODEL>
    <MODEL>
      <NAME>sample</NAME>
      <URL>http://volute.g-vo.org/svn/trunk/projects/dm/vo-dml/models/sample/sample/vo-
    </MODEL>
```

```
<GLOBALS>
  <INSTANCE ID="_icrs_frame" dmtype="sample:catalog.SkyCoordinateFrame">
    <ATTRIBUTE dmrole="sample:catalog.SkyCoordinateFrame.name">
      <LITERAL value="ICRS" dmtype="ivoa:string" />
    </ATTRIBUTE>
  </INSTANCE>

  <!-- somewhat bogus representation of SDSS's u band -->
  <INSTANCE ID="_sdss_u" dmtype="filter:PhotometryFilter">
    <ATTRIBUTE dmrole="filter:PhotometryFilter.name">
      <LITERAL value="sdss:u" dmtype="ivoa:string" />
    </ATTRIBUTE>
  </INSTANCE>

</GLOBALS>
```

```
<!-- ONLY annotated with STC(-like) elements -->
<TEMPLATES tableref="FIRST">
  <INSTANCE dmtype="sample:catalog.SkyCoordinate">
    <ATTRIBUTE dmrole="sample:catalog.SkyCoordinate.longitude">
      <COLUMN dmtype="ivoa:real" ref="FIRST.ra" />
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.SkyCoordinate.latitude">
      <COLUMN dmtype="ivoa:real" ref="FIRST.dec" />
    </ATTRIBUTE>
    <REFERENCE dmrole="sample:catalog.SkyCoordinate.frame">
      <IDREF>_icrs_frame</IDREF>
    </REFERENCE>
  </INSTANCE>
</TEMPLATES>
```

```
<TEMPLATES tableref="PhotoObjAll">
  <INSTANCE dmtype="sample:catalog.Source">
    <PRIMARYKEY>
      <PKFIELD>
        <COLUMN dmtype="ivoa:integer" ref="PhotoObjAll.objID" />
      </PKFIELD>
    </PRIMARYKEY>
    <ATTRIBUTE dmrole="sample:catalog.AbstractSource.type">
      <COLUMN dmtype="sample:catalog.SourceClassification" ref="PhotoObjAll.type">
        <OPTIONMAPPING>
          <MAPPEDOPTION>3</MAPPEDOPTION>
          <ENUMLITERAL>sample:catalog.SourceClassification.galaxy</ENUMLITERAL>
        </OPTIONMAPPING>
        <OPTIONMAPPING>
          <MAPPEDOPTION>6</MAPPEDOPTION>
          <ENUMLITERAL>sample:catalog.SourceClassification.star</ENUMLITERAL>
        </OPTIONMAPPING>
      </COLUMN>
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.AbstractSource.position">
      <INSTANCE dmtype="sample:catalog.SkyCoordinate">
        <ATTRIBUTE dmrole="sample:catalog.SkyCoordinate.longitude">
          <COLUMN dmtype="ivoa:real" ref="PhotoObjAll.ra" />
        </ATTRIBUTE>
        <ATTRIBUTE dmrole="sample:catalog.SkyCoordinate.latitude">
          <COLUMN dmtype="ivoa:real" ref="PhotoObjAll.dec" />
        </ATTRIBUTE>
        <REFERENCE dmrole="sample:catalog.SkyCoordinate.frame">
          <IDREF>_icrs_frame</IDREF>
        </REFERENCE>
      </INSTANCE>
    </ATTRIBUTE>
```

```
<COMPOSITION dmrole="sample:catalog.AbstractSource.luminosity">
  <INSTANCE dmtype="sample:catalog.LuminosityMeasurement">
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.value">
      <COLUMN dmtype="ivoa:RealQuantity" ref="PhotoObjAll.u" />
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.error">
      <COLUMN dmtype="ivoa:RealQuantity" ref="PhotoObjAll.err_u" />
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.type">
      <LITERAL dmtype="sample:catalog.LuminosityType" value="magnitude"></LITERAL>
    </ATTRIBUTE>
    <REFERENCE dmrole="sample:catalog.LuminosityMeasurement.filter">
      <!-- NEXT SHOULD POINT TO "PROPER" VO-DML INSTANCE OF THE FILTER -->
      <REMOTEREFERENCE>http://svo2.cab.inta-csic.es/svo/theory/fps3/index.php?id=SLOAN/SDSS.u</REMOTEREFERENCE>
    </REFERENCE>
  </INSTANCE>
  <INSTANCE dmtype="sample:catalog.LuminosityMeasurement">
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.value">
      <COLUMN dmtype="ivoa:RealQuantity" ref="PhotoObjAll.g" />
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.error">
      <COLUMN dmtype="ivoa:RealQuantity" ref="PhotoObjAll.err_g" />
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.type">
      <LITERAL dmtype="sample:catalog.LuminosityType" value="magnitude"></LITERAL>
    </ATTRIBUTE>
    <REFERENCE dmrole="sample:catalog.LuminosityMeasurement.filter">
      <!-- NEXT SHOULD POINT TO "PROPER" VO-DML INSTANCE OF THE FILTER -->
      <REMOTEREFERENCE>http://svo2.cab.inta-csic.es/svo/theory/fps3/index.php?id=SLOAN/SDSS.g</REMOTEREFERENCE>
    </REFERENCE>
  </INSTANCE>
```

```
<COMPOSITION dmrole="sample:catalog.AbstractSource.luminosity">
  <INSTANCE dmtype="sample:catalog.LuminosityMeasurement">
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.value">
      <COLUMN dmtype="ivoa:RealQuantity" ref="PhotoObjAll.u" />
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.error">
      <COLUMN dmtype="ivoa:RealQuantity" ref="PhotoObjAll.err_u" />
    </ATTRIBUTE>
    <ATTRIBUTE dmrole="sample:catalog.LuminosityMeasurement.type">
      <LITERAL dmtype="sample:catalog.LuminosityType" value="magnitude"></LITERAL>
    </ATTRIBUTE>
    <REFERENCE dmrole="sample:catalog.LuminosityMeasurement.filter">
      <!-- NEXT SHOULD POINT TO "PROPER" VO-DML INSTANCE OF THE FILTER -->
      <REMOTEREFERENCE>http://svo2.cab.inta-csic.es/svo/theory/fps3/index.php?id=SLOAN/
    </REFERENCE>
  </INSTANCE>
```

Why

```
<ATTRIBUTE dmrole="sample:catalog.SkyCoordinate.longitude">
  <COLUMN dmtype="ivoa:real" ref="FIRST.ra" />
</ATTRIBUTE>
```

Why not

```
<ATTRIBUTE dmrole="sample:catalog.SkyCoordinate.longitude"
  dmtype="ivoa:real" ref="FIRST.ra" />
```

Answer: Multiplicity >1

Why

```
<REFERENCE dmrole="sample:catalog.SkyCoordinate.frame">
  <IDREF>_icrs_frame</IDREF>
</REFERENCE>
```

Why not

```
<REFERENCE dmrole="sample:catalog.SkyCoordinate.frame"
   idref="_icrs_frame"/>
```

Answer: Multiplicity >1

Why

```
<PRIMARYKEY>
  <PKFIELD>
    <COLUMN dmtype="ivoa:integer" ref="PhotoObjAll.objID" />
  </PKFIELD>
</PRIMARYKEY>
```

Answer: # of primary columns may be > 1

Continue?